SCIENCE

NEW YORK, JUNE 19, 1891.

LOCUSTS IN ALGERIA.

In his last report on Algerian agriculture, Sir Lambert Playfair remarks on the spread of locusts from the eastern part of the province, to which they had hitherto for the most part confined their ravages, to the central regions. Until the eminent entomologist D'Herculais studied the matter carefully, no specific distinction among the locusts was recognized. He has now shown, according to the London *Times*, that there are two distinct species, belonging to separate genera, each of which has very marked peculiarities. These are the best known of the Biblical species, *Acridium peregrinum*, and the *Strauronotus maroccanus*. Their habits are quite different, the former generally arriving suddenly about April or May, in immense flights, and devastating the green crops. The females penetrate deeply into the moist earth, and deposit their eggs, from eighty to ninety in number, inclosed in a cocoon. Two months afterwards the young locusts or crickets are hatched. They grow rapidly, get their wings in forty-five days, and then continue their career of devastation far in advance.

The other species appear in a winged state in July and August. They also ravage what green exists at that season, and the females deposit their eggs at a much less depth than the others, generally on rocky ground. The cocoons do not contain more than thirty or forty eggs, and they remain without being hatched till the spring of the following year. The first species finds in central Africa the most favorable circumstances for its development; the second, in more temperate countries, such as the Mediterranean region, and even the Caucasus, Crimea, and Asia Minor. It is the latter that has ravaged Algeria during the last few years, but about the middle of December last the arrival of flights of the *Acridium* was reported from several of the oases of the extreme south. Fortunately man is not the only enemy of the locust. Starlings and larks feed eagerly on the eggs. Wagon-loads of these birds used constantly to be sent to the French market, but now the killing of them has been prohibited in the province of Constantine. The larvæ of the *Bombyx cantharis* and other insects also get into the cocoons, and often kill from ten to fifty per cent of the eggs, while minute cryptogamic organisms destroy many more.

The best method of contending against the locust has been very carefully studied. Much has been accomplished by ploughing the ground deeply as soon as possible after the eggs have been laid, so as to bring them to the surface, and thus allow them to become an easy prey to birds and insects. The collection and destruction of the cocoons by manual labor is less sure and more costly, but it has the advantage of affording employment to Arabs, who have been reduced to great misery by the destruction of their crops. The statistics of locusts thus destroyed is startling. It has been calculated that between August and December, 1888, the enormous quantity of 8,000 cubic metres of cocoons were collected and destroyed, and that these contained 200,000,000,000 eggs. After the insects were hatched, 1,200,000,000,000 crickets were killed, and it was the excess beyond these figures that invaded the land.

It is now admitted that the most efficacious means of waging war on the locusts is to concentrate all available resources on the destruction of the young. They remain quite stationary during five or six days after being hatched, and thus time is allowed for their destruction. The Arabs employ very primitive means: they jump among them, treading and crushing them under foot, beating about in every direction with branches of broom and oleander, and lighting immense fires all over the place, with alfa grass, or any dry brushwood that may be available. The most practical method is the use of screens similar to those employed in Cyprus. These are bands of cotton stuff, twenty to twenty-five metres in length, on which are sewn strips of American wax-cloth. The young crickets climb up the former, but when they arrive at the latter they can find no foothold, and tumble back into ditches prepared for their reception, along which sheets of zinc are placed to prevent their egress. As soon as the ditches are filled, the insects are covered over with earth and the screens advanced. During last season the material provided in Algeria, but which was altogether insufficient, was 6,000 screens, each 50 metres long; 100,000 oak pickets; 6,000 steel hammers; 450,000 metres of cord; and 60,000 sheets of zinc.

STEAM-JACKET EFFICIENCY.

In a paper on "Maximum Steam-Jacket Efficiency," contributed to the Journal of the Franklin Institute, Professor Robert H. Thurston says the fact is sufficiently well known that the steam-jacket, as employed on the steam engine, of whatever form and arrangement, is intrinsically a wasteful element, and that its use only gives, in certain cases, an economical advantage by its repression of wastes of larger magnitude. It checks a serious unavoidable waste, more or less completely, by a process which as inevitably involves a waste which is commonly, but, perhaps, not invariably, a lesser one. The ideal steam engine, such as is treated of in the purely thermodynamic study of the steam engine, has a lower efficiency with, than it has without, a jacket. This is readily seen from illustrations computed and checked by Messrs. Hitchcock and Mount, at the suggestion of Professor Thurston, and published in his paper; and it is sufficiently evident, *à priori*, from the consideration that the unjacketed engine receives all its steam at a maximum temperature, expands it adiabatically to a certain terminal temperature, and then exhausts it; while the jacketed receives a part of its heat at intermediate temperatures, expands the fluid non-adiabatically, and finally rejects it at the terminal temperature, with a lower mean range of expansion. In other words, the jacketed engine departs furthest from the principles of economical operations first enunciated by Carnot: "All heat should be received at maximum temperature; expansion should be perfectly adiabatic, and should continue to the minimum temperature and pressure, and all should be rejected as nearly as possible at that minimum." Thus, "theoretically," if the use of that much-abused term may be permitted in this sense, the unjacketed engine is more efficient than the jacketed engine. "Practically," however, the reverse is usually, though probably not always, the case, and the use of the jacket is often found to be productive of a real, and sometimes of large, economy. It is thus obvious that the advantages of the employment of the jacket come of those conditions which distinguish so markedly the real from the ideal case in steam-engine economy; those which make the "theory of the real engine," as the writer has called it, essentially different, in important respects, from the "theory of the ideal engine." In 1886 a "research committee" was appointed by the British Institution of Mechanical Engineers, to investigate the subject of the steam jacket. A very unusually complete set of data, pertaining to trials made with a view to determine the efficiency produced by application of the jacket, was secured. From computations based on these data, performed with great care, the computers checking the figures and the results, there can be no doubt of the existence of a maximum in the value of the steam jacket, the ratios of expansion being varied, and it is probably fairly to be assumed that it may be found in all cases. In the first case, that of the simple non-condensing Corliss engine, the heads unjacketed, the use of the jacket reduced the cylinder wastes from about twenty-five per cent of the ideal consumption of steam and

feed-water to about half that proportion, for ratios of expansion approximating six; from one-third to about one-tenth, at a ratio of five; and apparently from twenty to ten per cent at 4.4. In this first case, also, the jacket gives best results, with 110 pounds of steam, when the ration of expansion approximates six. When the steam pressure falls to approximately eighty pounds, the best work of the jacket occurs at a ratio not far from 4.75; while, at a pressure of fifty pounds, the value of the jacket increases through the whole range of the experiments, and not only so, but the indications are of probable improvement indefinitely in the direction of increasing expansion. The highest efficiencies, however, either with or without the jacket, are found, in this case, at the lowest ratios adopted, and indicate a maximum value at about 3 25. The ratios of expansion for maximum efficiency of fluid, in the other cases, are for 110 pounds, about five, and for eighty pounds, about 3 5. Similarly studying the performance of the condensing engine, we find that the best work is done, whether jacketed or not, at about a ratio of expansion of ten (at a steam pressure of 110 pounds), but that the jacketed engine reduces the internal wastes from fifty per cent at highest ratios, and from one-fourth at the lowest ratios, in the case of the unjacketed engine, to five per cent, and, in some cases, probably to within the magnitude of the errors of observation. At a pressure of ninety pounds the best ratio seems to be for this engine, under the given conditions of operation, about 6.5 when unjacketed, and 8.5 jacketed; while the lower pressures still further reduce both the efficiencies and the savings effected by the jacket. The best work of the jacket, as an economizer of heat, is done at high pressure, at a ratio of expansion of twelve or more. In all cases it seems to be the fact, with these engines at least, that the jacket is useful beyond the ratios of maximum efficiency of fluid. The compound engine exhibits the same general effects which have been noted in the cases of simple engines. This discovery of a maximum efficiency of jacket may throw some light upon the causes of the conflicting and sometimes apparently irreconcilable results of trials of engines with and without jackets, and with jackets variously constructed. The discovery may also prove of value to the designer, as aiding him in securing the best proportions and arrangement of his engine.

THE PREVAILING FEVERS OF CHINA.

DR. COLTMAN, writing in the *Medical Missionary Journal* upon the fevers of China, remarks, says the *Lancet*, that but little personal investigation on the subject has been made up to the present time, owing to the comparatively recent advent of foreign medical men, and to the want of confidence on the part of natives to submit for any lengthened period to the treatment of a foreign physician, or, in fact, to any one physician, their rule being to change doctors two or three times a day if they can afford it. Again, there have been but small hospital facilities for studying fevers, and there is an impossibility of obtaining post-mortem examinations. Dr. Coltman considers that small-pox is the most common disease, nearly every person suffering from it at some period of his or her life. Vaccination, although practiced, is done very carelessly. Measles appear to be common, but are somewhat milder than in Europe. Scarlet-fever, although it undoubtedly occurs among the natives, is far less common than among Europeans. Erysipelas is rare. Typhoid-fever is very difficult to diagnose in the short time that a foreign medical man is allowed to attend a case; but Dr. Coltman thinks that when more accurate reports are possible, this disease will be found to be more common among the natives than is now supposed. Typhus-fever is met with all over North China, and as far south as Shanghai. Relapsing fever is found constantly associated with typhus. Dengue does not seem to be known among natives. Cholera occurs as an epidemic every few years, and is very fatal. Diphtheria is severe, and frequently fatal among the natives. Whooping-cough has occasionally been met with. Rheumatic fever is very prevalent in some parts. Chronic muscular rheumatism is common all over China, but is unattended by fever. Malarial fevers appear to be common everywhere, though the prevailing type varies; thus, tertian is most common in Pekin, quartan in Foochow, Swatow, Shanghai, and Hangchow, and remittent in Cheefoo and Tientsin. In Chinanfu, Dr. Coltman has never seen a case of quartan ague; it is all intermittent of the tertian or quotidian type. The treatment, of course, of all malarial fever is by quinine or some other cinchona bark alkaloid. In Hangchow the carbolic acid and iodine treatment has been used successfully as a prophylactic; arsenic is recognized as valuable in the chronic form.

NOTES AND NEWS.

THE trustees of the University of Pennsylvania have elected Dr. George A. Peirsol, professor of anatomy; Dr. Harrison Allen, professor of comparative anatomy; and Dr. John B. Deaver, assistant professor of applied anatomy.

— Mr. Emil Theilman, a graduate of the Missouri State University, has been appointed to a position as aide on the State Geological Survey.

— Professor Henry S. Munroe is to have charge of the Columbia College School of Mines' summer school of surveying at Litchfield, Conn.

— Professor J. F. Kemp of Cornell University, Ithaca, N.Y., has been appointed adjunct professor of geology at Columbia College, New York.

— The *Engineering and Mining Journal* of this city states that extensive deposits of onyx have been discovered near Marion, Smyth County, Va. Four openings are reported to have been made so far. The stone is said to be of excellent quality.

— The Marine Laboratory of the Johns Hopkins University will be open this summer at Port Antonio on the north-east coast of Jamaica. Professor Brooks and a number of members of his party have already started for the station.

— A writer in *Science Gossip* says that the philosopher Kant one day was passing a certain building in his daily walk, and on looking up, he discovered, as he fancied, that the old birds were actually throwing their young ones out of the nests. It was a season remarkable for the scarcity of insects, and the birds were apparently sacrificing some of their progeny to save the rest.

— The harbor of Salonica, says the *Scottish Geographical Magazine*, is threatened with the same fate as that which has befallen Smyrna. Owing to the alluvial deposits of the Vardar, the harbor is becoming useless as a trading port. The entrance through the sandbanks is very difficult, and the delta of the river has advanced to the neighborhood of Cape Kara-Burun. The prospective value of Salonica to Austria-Hungary may therefore be questioned.

— The recent census of Bengal, says the London *Times* correspondent, in a dispatch of March 27, throws an instructive light on the sanitary condition of the province. The districts showing a decrease in population are mainly those where defective subsoil drainage produces malaria. This is especially marked in parts of Nadiya and Jessor, and is due to the fact that the natural drainage channels have been blocked by injudicious cultivation, and the want of sufficient provision for a water-way in the construction of the railway.

— We learn from the *Scottish Geographical Magazine* that Dr. Konrad Gauzenmüller has published in the *Zeitschrift für wissenschaftliche Geographie* (Bd. viii., Heft 1) a learned and able paper illustrating his hypothesis that the Ukerewe, or Victoria Nyanza, is identical with the Eastern Nile sources of Ptolemy, with the Crocodile Lake of an unknown Greek writer, and with "Kura Kavar" of the Arabs, and that fairly accurate knowledge of the territory of the Nile sources was formerly possessed, but subsequently was lost.

— The collections of fishes made by the "Albatross" in 1887-88, at the Galapagos Islands and in Panama Bay, were reported on by Jordan and Bollmann in the "Proceedings of the United States National Museum," 1889, pp. 149-183. A small portion of the collection, however, failed to reach the authors in time for their report, and has now been listed by Charles H. Gilbert, professor of geology in the University of Indiana. The supplementary list is noteworthy as containing the remarkable new genus *Dialommus* which repeats in the *Blenniidæ* the peculiar structure of the eye seen in the Cyprinodont genus *Anableps*.